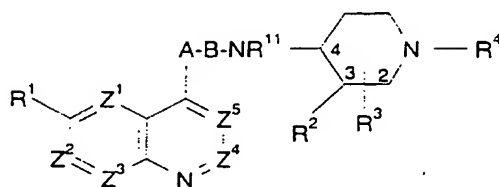


CLAIMS:

1. A compound of formula (I) or a pharmaceutically acceptable derivative thereof:



(I)

wherein:

- one of Z¹, Z², Z³, Z⁴ and Z⁵ is N, one is CR^{1a}, and the remainder are CH, or one of Z¹, Z², Z³, Z⁴ and Z⁵ is CR^{1a}, and the remainder are CH:

- R¹ and R^{1a} are independently hydrogen; hydroxy; (C₁₋₆)alkoxy optionally substituted by (C₁₋₆)alkoxy, amino, piperidyl, guanidino or amidino optionally N-substituted by one or two (C₁₋₆)alkyl, acyl or (C₁₋₆)alkylsulphonyl groups, CONH₂, hydroxy, thiol, (C₁₋₆)alkylthio, heterocyclylthio, heterocyclioxy, arylthio, aryloxy, acyloxy or (C₁₋₆)alkylsulphonyloxy; (C₁₋₆)alkoxy-substituted(C₁₋₆)alkyl; halogen: (C₁₋₆)alkyl; (C₁₋₆)alkylthio; nitro; azido; acyl; acyloxy; acylthio; (C₁₋₆)alkylsulphonyl; (C₁₋₆)alkylsulphoxide; arylsulphonyl; arylsulphoxide or an amino, piperidyl, guanidino or amidino group optionally N-substituted by one or two (C₁₋₆)alkyl, acyl or (C₁₋₆)alkylsulphonyl groups; and additionally when Z⁵ is CR^{1a}, R^{1a} may be (C₁₋₄)alkyl-CO₂H or (C₁₋₄)alkyl-CONH₂ in which the C₁₋₄ alkyl is substituted by R¹²; (C₁₋₄)alkyl substituted by amino, cyano or guanidino; aminocarbonyl optionally substituted by hydroxy, (C₁₋₆)alkyl, hydroxy(C₁₋₆)alkyl, aminocarbonyl(C₁₋₆)alkyl, (C₂₋₆)alkenyl, (C₁₋₆)alkylsulphonyl, trifluoromethylsulphonyl, (C₂₋₆)alkenylsulphonyl, (C₁₋₆)alkoxycarbonyl, (C₁₋₆)alkylcarbonyl, (C₂₋₆)alkenyloxycarbonyl, (C₂₋₆)alkenylcarbonyl, or CH(R¹³)CO₂H or CH(R¹³)CONH₂ optionally further substituted by (C₁₋₆)alkyl, hydroxy(C₁₋₆)alkyl, aminocarbonyl(C₁₋₆)alkyl or (C₂₋₆)alkenyl; hydroxy(C₁₋₆)alkyl; carboxy: cyano or (C₁₋₆)alkoxycarbonyl; wherein R¹³ is a natural α-amino acid side chain, or its enantiomer: provided that when one of Z¹, Z², Z³, Z⁴ and Z⁵ is CR^{1a} and the remainder are CH, then R¹ is not hydrogen;

R² is hydrogen;

R³ is hydrogen; or

R³ is in the 2-, 3- or 4-position and is:

- 5 carboxy; (C₁₋₆)alkoxycarbonyl; aminocarbonyl wherein the amino group is optionally substituted by hydroxy, (C₁₋₆)alkyl, hydroxy(C₁₋₆)alkyl, aminocarbonyl(C₁₋₆)alkyl, (C₂₋₆)alkenyl, (C₁₋₆)alkylsulphonyl, trifluoromethylsulphonyl, (C₂₋₆)alkenylsulphonyl, (C₁₋₆)alkoxycarbonyl, (C₁₋₆)alkylcarbonyl, (C₂₋₆)alkenyloxycarbonyl or (C₂₋₆)alkenylcarbonyl and optionally further substituted by (C₁₋₆)alkyl, hydroxy(C₁₋₆)alkyl,
 - 10 aminocarbonyl(C₁₋₆)alkyl or (C₂₋₆)alkenyl; cyano; tetrazolyl; 2-oxo-oxazolidinyl optionally substituted by R¹⁰; 3-hydroxy-3-cyclobutene-1,2-dione-4-yl; 2,4-thiazolidinedione-5-yl; tetrazol-5-ylaminocarbonyl; 1,2,4-triazol-5-yl optionally substituted by R¹⁰; or 5-oxo-1,2,4-oxadiazol-3-yl; or (C₁₋₄)alkyl or ethenyl optionally substituted with any of the substituents listed above for
 - 15 R³ and/or up to 3 groups R¹² independently selected from:

thiol; halogen; (C₁₋₆)alkylthio; trifluoromethyl; azido; (C₁₋₆)alkoxycarbonyl; (C₁₋₆)alkylcarbonyl; (C₂₋₆)alkenyloxycarbonyl; (C₂₋₆)alkenylcarbonyl; hydroxy optionally substituted by (C₁₋₆)alkyl, (C₂₋₆)alkenyl, (C₁₋₆)alkoxycarbonyl, (C₁₋₆)alkylcarbonyl, (C₂₋₆)alkenyloxycarbonyl, (C₂₋₆)alkenylcarbonyl or aminocarbonyl
 - 20 wherein the amino group is optionally substituted by (C₁₋₆)alkyl, (C₂₋₆)alkenyl, (C₁₋₆)alkylcarbonyl or (C₂₋₆)alkenylcarbonyl; amino optionally mono- or disubstituted by (C₁₋₆)alkoxycarbonyl, (C₁₋₆)alkylcarbonyl, (C₂₋₆)alkenyloxycarbonyl, (C₂₋₆)alkenylcarbonyl, (C₁₋₆)alkyl, (C₂₋₆)alkenyl, (C₁₋₆)alkylsulphonyl, (C₂₋₆)alkenylsulphonyl or aminocarbonyl wherein the amino group is optionally substituted
 - 25 by (C₁₋₆)alkyl or (C₂₋₆)alkenyl; aminocarbonyl wherein the amino group is optionally substituted by (C₁₋₆)alkyl, hydroxy(C₁₋₆)alkyl, aminocarbonyl(C₁₋₆)alkyl, (C₂₋₆)alkenyl, (C₁₋₆)alkoxycarbonyl, (C₁₋₆)alkylcarbonyl, (C₂₋₆)alkenyloxycarbonyl or (C₂₋₆)alkenylcarbonyl and optionally further substituted by (C₁₋₆)alkyl, hydroxy(C₁₋₆)alkyl, aminocarbonyl(C₁₋₆)alkyl or (C₂₋₆)alkenyl; oxo; (C₁₋₆)alkylsulphonyl; (C₂₋₆)alkenylsulphonyl; or (C₁₋₆)aminosulphonyl wherein the amino group is optionally
 - 30 substituted by (C₁₋₆)alkyl or (C₂₋₆)alkenyl;
- in addition when R³ is disubstituted with a hydroxy or amino containing substituent and a carboxy containing substituent these may together form a cyclic ester or amide linkage, respectively; or
- 35 when R³ is in the 3-position R² and R³ may together form a divalent residue =CR^{5'}R^{6'} where R^{5'} and R^{6'} are independently selected from hydrogen, (C₁₋₆)alkyl, (C₂₋₆)alkenyl,

aryl(C₁₋₆)alkyl and aryl(C₂₋₆)alkenyl, any alkyl or alkenyl moiety being optionally substituted by up to three R¹² groups;

R⁴ is a group -CH₂-R⁵ in which R⁵ is selected from:

- 5 (C₁₋₁₂)alkyl; hydroxy(C₁₋₁₂)alkyl; (C₁₋₁₂)alkoxy(C₁₋₁₂)alkyl; (C₁₋₁₂)alkanoyloxy(C₁₋₁₂)alkyl; (C₃₋₆)cycloalkyl; hydroxy(C₃₋₆)cycloalkyl; (C₁₋₁₂)alkoxy(C₃₋₆)cycloalkyl; (C₁₋₁₂)alkanoyloxy(C₃₋₆)cycloalkyl; (C₃₋₆)cycloalkyl(C₁₋₁₂)alkyl; hydroxy-, (C₁₋₁₂)alkoxy- or (C₁₋₁₂)alkanoyloxy-(C₃₋₆)cycloalkyl(C₁₋₁₂)alkyl; cyano: cyano(C₁₋₁₂)alkyl; (C₂₋₁₂)alkenyl; (C₂₋₁₂)alkynyl; tetrahydrofuryl;
- 10 mono- or di-(C₁₋₁₂)alkylamino(C₁₋₁₂)alkyl; acylamino(C₁₋₁₂)alkyl; (C₁₋₁₂)alkyl- or acyl-aminocarbonyl(C₁₋₁₂)alkyl; mono- or di- (C₁₋₁₂)alkylamino(hydroxy) (C₁₋₁₂)alkyl; optionally substituted phenyl(C₁₋₁₂)alkyl, phenoxy(C₁₋₁₂)alkyl or phenyl(hydroxy)(C₁₋₁₂)alkyl; optionally substituted diphenyl(C₁₋₁₂)alkyl; optionally substituted phenyl(C₂₋₁₂)alkenyl; optionally substituted benzoyl or benzoyl(C₁₋₁₂)alkyl;
- 15 optionally substituted heteroaryl or heteroaryl(C₁₋₁₂)alkyl; and optionally substituted heteroaroyl or heteroaroyl(C₁₋₁₂)alkyl;

A is CR⁶R⁷ and B is SO₂, CO or CH₂ wherein:

- each of R⁶ and R⁷ is independently selected from: hydrogen; (C₁₋₆)alkoxy; thiol; (C₁₋₆)alkylthio; halo; trifluoromethyl; azido; (C₁₋₆)alkyl; (C₂₋₆)alkenyl; (C₁₋₆)alkoxycarbonyl; (C₁₋₆)alkylcarbonyl; (C₂₋₆)alkenyloxycarbonyl; (C₂₋₆)alkenylcarbonyl; hydroxy, amino or aminocarbonyl optionally substituted as for corresponding substituents in R³; (C₁₋₆)alkylsulphonyl; (C₂₋₆)alkenylsulphonyl; or (C₁₋₆)aminosulphonyl wherein the amino group is optionally substituted by (C₁₋₆)alkyl or
- 25 (C₂₋₆)alkenyl;

- R¹⁰ is selected from (C₁₋₄)alkyl; (C₂₋₄)alkenyl and aryl any of which may be optionally substituted by a group R¹² as defined above; carboxy; aminocarbonyl wherein the amino group is optionally substituted by hydroxy, (C₁₋₆)alkyl, (C₂₋₆)alkenyl, (C₁₋₆)alkylsulphonyl, trifluoromethylsulphonyl, (C₂₋₆)alkenylsulphonyl, (C₁₋₆)alkoxycarbonyl, (C₁₋₆)alkylcarbonyl, (C₂₋₆)alkenyloxycarbonyl or (C₂₋₆)alkenylcarbonyl and optionally further substituted by (C₁₋₆)alkyl or (C₂₋₆)alkenyl; (C₁₋₆)alkylsulphonyl; trifluoromethylsulphonyl; (C₂₋₆)alkenylsulphonyl; (C₁₋₆)alkoxycarbonyl; (C₁₋₆)alkylcarbonyl; (C₂₋₆)alkenyloxycarbonyl; and (C₂₋₆)alkenylcarbonyl;
- 30
- 35

and R¹¹ is hydrogen; or (C₁₋₄)alkyl or (C₂₋₄)alkenyl optionally substituted with 1 to 3 groups selected from:
 carboxy; (C₁₋₄)alkoxycarbonyl; (C₁₋₄)alkylcarbonyl; (C₂₋₄)alkenyloxycarbonyl; (C₂₋₄)alkenylcarbonyl; aminocarbonyl wherein the amino group is optionally substituted by
 5 hydroxy, (C₁₋₄)alkyl, hydroxy(C₁₋₄)alkyl, aminocarbonyl(C₁₋₄)alkyl, (C₂₋₄)alkenyl, (C₁₋₄)alkylsulphonyl, trifluoromethylsulphonyl, (C₂₋₄)alkenylsulphonyl, (C₁₋₄)alkoxycarbonyl, (C₁₋₄)alkylcarbonyl, (C₂₋₄)alkenyloxycarbonyl or (C₂₋₄)alkenylcarbonyl; cyano; tetrazolyl; 2-oxo-oxazolidinyl optionally substituted by R¹⁰; 3-hydroxy-3-cyclobutene-1,2-dione-4-yl; 2,4-thiazolidinedione-5-yl; tetrazol-5-ylaminocarbonyl; 1,2,4-triazol-5-yl optionally substituted by R¹⁰; 5-oxo-1,2,4-oxadiazol-3-yl; thiol; halogen; (C₁₋₄)alkylthio; trifluoromethyl; azido; hydroxy optionally substituted by (C₁₋₄)alkyl, (C₂₋₄)alkenyl, (C₁₋₄)alkoxycarbonyl, (C₁₋₄)alkylcarbonyl, (C₂₋₄)alkenyloxycarbonyl, (C₂₋₄)alkenylcarbonyl; oxo; (C₁₋₄)alkylsulphonyl; (C₂₋₄)alkenylsulphonyl; or (C₁₋₄)aminosulphonyl wherein the amino group is optionally
 15 substituted by (C₁₋₄)alkyl or (C₂₋₄)alkenyl.

2. A compound according to claim 1 wherein:

- (a) Z¹ is N, and Z²-Z⁵ are CH,
 (b) Z¹-Z⁵ are each CH, or
 20 (c) Z⁵ is N, and Z¹-Z⁴ are CH,
 and Z³ may instead be CF.

3. A compound according to claim 1 or 2 wherein R¹ and R^{1a} are independently methoxy, amino(C₃₋₅)alkyloxy, guanidino(C₃₋₅)alkyloxy, piperidyl(C₃₋₅)alkyloxy, nitro
 25 or fluoro.

4. A compound according to any one of the preceding claims wherein R³ is hydrogen; (C₁₋₄)alkyl; ethenyl; optionally substituted 1-hydroxy(C₁₋₄)alkyl; carboxy; (C₁₋₆)alkoxycarbonyl; optionally substituted aminocarbonyl; carboxy(C₁₋₄)alkyl; optionally substituted aminocarbonyl(C₁₋₄)alkyl; cyano(C₁₋₄)alkyl; optionally substituted 2-oxo-oxazolidinyl or optionally substituted 2-oxo-oxazolidinyl(C₁₋₄)alkyl).
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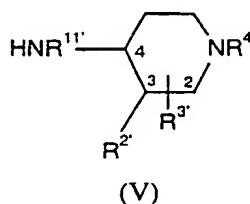
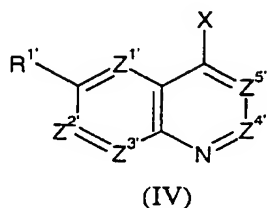
5. A compound according to any one of the preceding claims wherein R³ is in the 3-position and the substituents at the 3- and 4-position of the piperidine ring are *cis*.

35

6. A compound according to any one of the preceding claims wherein A is CHOH or CH₂, and B is CH₂.

7. A compound according to any one of the preceding claims wherein R¹¹ is hydrogen.
- 5 8. A compound according to any one of the preceding claims wherein R⁴ is (C₅₋₁₂)alkyl, optionally substituted phenyl(C₂₋₃)alkyl or optionally substituted phenyl(C₃₋₄)alkenyl.
9. A compound according to claim 1 selected from:
- 10 1-Heptyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)]ethylaminopiperidine;
cis-3-(R/S)-Ethoxycarbonyl-1-heptyl-4-(S/R)-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)]ethylaminopiperidine;
cis-3-(R/S)-Aminocarbonyl-1-heptyl-4-(S/R)-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)]ethylaminopiperidine;
- 15 cis-1-Heptyl-3-(R/S)-hydroxymethyl-4-(S/R)-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)]ethylaminopiperidine;
cis-3-(R/S)-carboxy-1-heptyl-4-(S/R)-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)]ethylaminopiperidine;
1-Heptyl-4-[2-(S)-hydroxy-2-(6-methoxyquinolin-4-yl)]ethylaminopiperidine; or
- 20 1-Heptyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)]ethyl(N-methyl)aminopiperidine;
or a pharmaceutically acceptable derivative thereof.
10. A pharmaceutical composition comprising a compound of formula (I) as defined in claim 1, or a pharmaceutically acceptable derivative thereof, and a pharmaceutically acceptable carrier.
- 25
11. A method of treatment of bacterial infections in mammals which method comprises the administration to a mammal in need of such treatment an effective amount of a compound of formula (I) as defined in claim 1, or a pharmaceutically acceptable derivative thereof.
- 30
12. The use of a compound of formula (I) as defined in claim 1, or a pharmaceutically acceptable derivative thereof, in the manufacture of a medicament for use in the treatment of bacterial infections in mammals.
- 35
13. A process for preparing a compound of formula (I) as defined in claim 1, or a pharmaceutically acceptable derivative thereof, which process comprises:

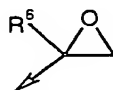
reacting a compound of formula (IV) with a compound of formula (V):



wherein $Z^{1'}$, $Z^{2'}$, $Z^{3'}$, $Z^{4'}$, $Z^{5'}$, $R^{11'}$, R^1 , R^2 , R^3 and R^4 are Z^1 , Z^2 , Z^3 , Z^4 , Z^5 , R^{11} , R^1 , R^2 , R^3 and R^4 as defined in formula (I) or groups convertible thereto; and:

- (i) X is $CR^6R^7SO_2W$
- (ii) X is $A'-COW$
- (iii) X is $CR^6=CH_2$
- (iv) X is oxirane and

in which W is a leaving group e.g. halogen, A' is A as defined in formula (I), or a group convertible thereto, and oxirane is:



- wherein R^6 and R^7 are as defined in formula (I); and thereafter optionally or as necessary converting $Z^{1'}$, $Z^{2'}$, $Z^{3'}$, $Z^{4'}$, $Z^{5'}$, A' , $R^{11'}$, R^1 , R^2 , R^3 and R^4 to Z^1 , Z^2 , Z^3 , Z^4 , Z^5 , A, R^{11} , R^1 , R^2 , R^3 and R^4 , converting A-B to other A-B, interconverting R^{11} , R^1 , R^2 , R^3 and/or R^4 , and/or forming a pharmaceutically acceptable derivative thereof.